Appendices

APPENDIX A. SEDIMENTATION RATE DATA FOR SELECTED DAMS

Sedimentation rate data were obtained for fourteen reservoirs/dams in Central and Southern California. The dams were selected based upon the size of the undammed drainage basin that they control (at least thirty square miles), proximity to the coast (less than thirty miles from the ocean), and the availability of data. The agency reports, from which average sedimentation rate data were derived, did not provide information on extreme events or how the sedimentation rate data were obtained.

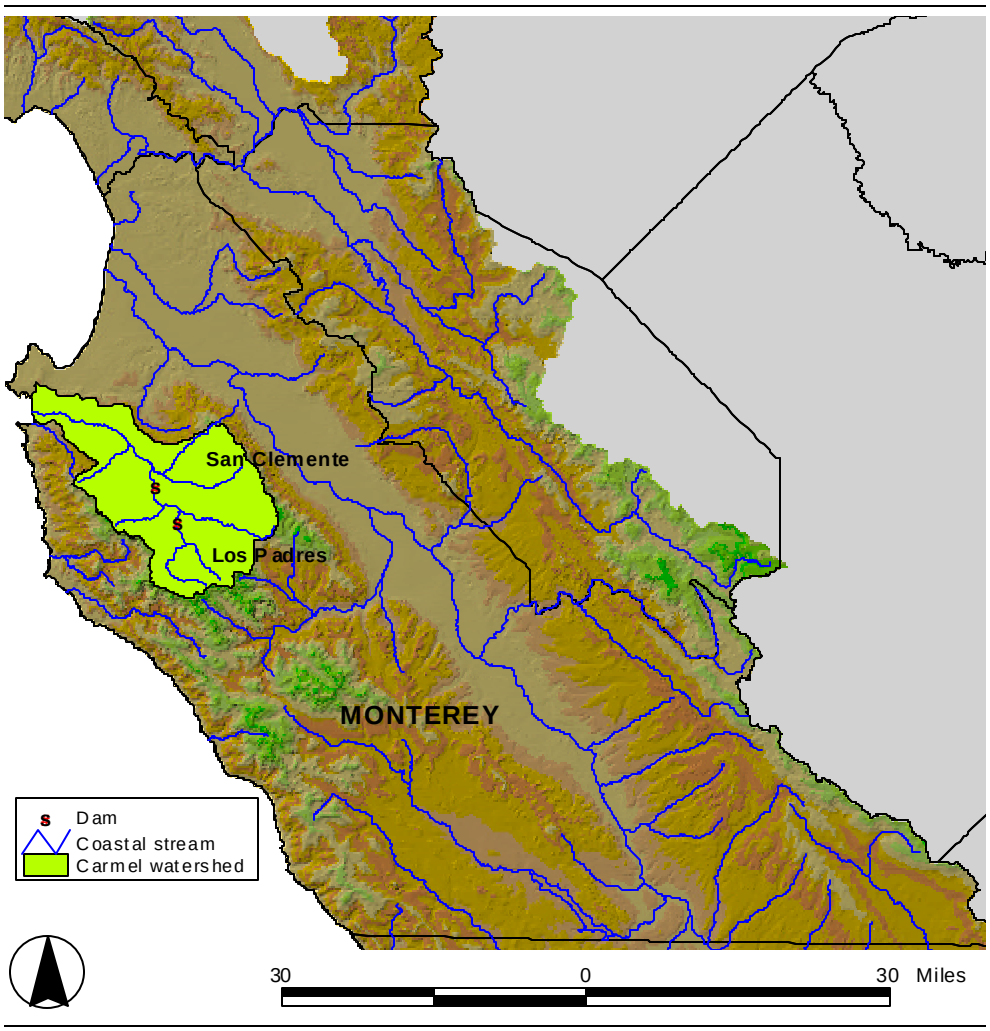

Figure A.1 Locations of Los Padres and San Clemente Dams on the Carmel River in Monterey County

Monterey County: Two dams in Monterey County are discussed: Los Padres and San Clemente (Figure A.1). The data for Los Padres Dam were provided by Mr. Andy Bell, District Engineer for the Monterey Peninsula Water Management District. Los Padres Dam is located on the Carmel River and its primary purpose is water supply. It was completed in 1949, and had an

initial capacity of about 4,840,000 cubic yards. Mr. Bell estimated that capacity had been reduced to about 3,230,000 cubic yards by 2000 (original data provided in acre feet, and converted here). For those 51 years of operation, therefore, the average sedimentation rate has been about 30,000 cubic yards per year.

The data for San Clemente Dam also were provided by Mr. Bell. These data were based upon a dredging feasibility study conducted by Moffatt and Nichol in 1996. The San Clemente Dam also is located on the Carmel River, and its primary purpose is water supply. It was completed in 1921, and had an initial capacity of about 2,300,000 cubic yards. The Moffatt and Nichol study indicated that, by 1996, the reservoir's capacity had been reduced to about 240,000 cubic yards (original data provided in acre feet, and converted here). For those 75 years of operation, therefore, the average sedimentation rate has been about 30,000 cubic yards per year.

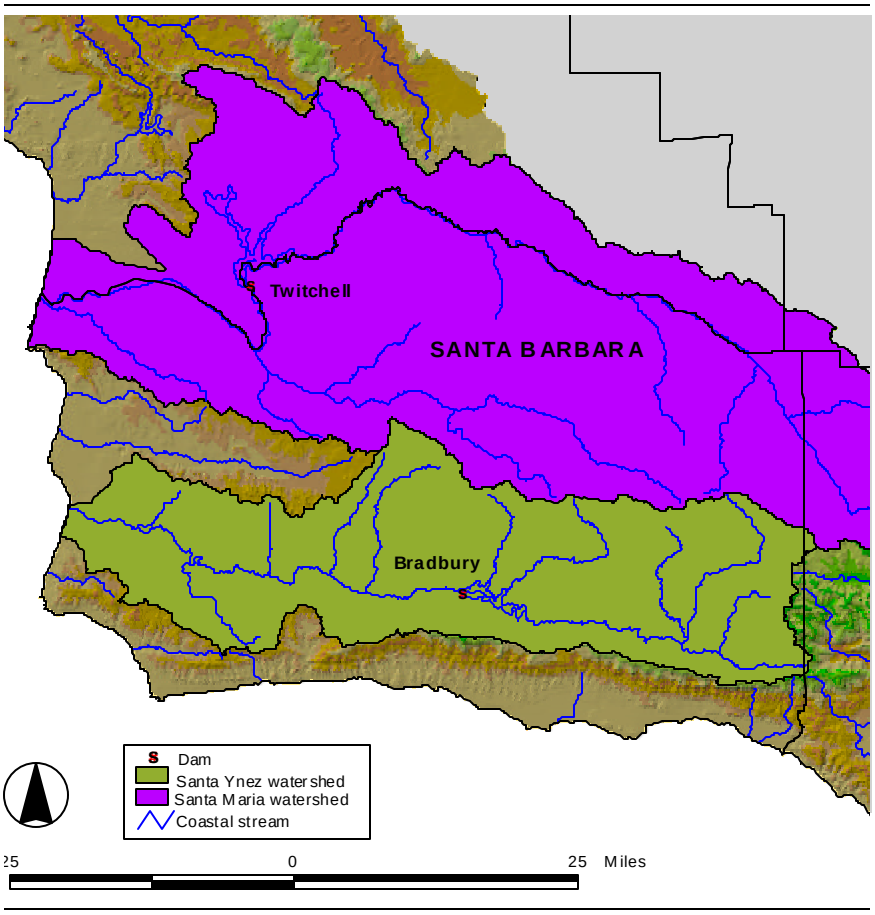

Figure A.2 Locations of Bradbury Dam on the Santa Ynez River, and Twitchell Dam on the Cuyama River in Santa Barbara County

Santa Barbara County: Two dams in Santa Barbara County are discussed: Bradbury and Twitchell (Figure A.2). The data for Bradbury Dam were provided by Mr. Robert Wignot, General Manager of the (Lake) Cachuma Operation and Maintenance Board. Bradbury Dam is located on the Santa Ynez River, and its primary purpose is water supply. It was completed in 1953, and had an initial capacity of about 330,660,000 cubic yards. A bathymetric survey of the reservoir was conducted in 2000 by MNS Engineering. The results of this survey indicated that the capacity of Lake Cachuma had been reduced to about 303,300,000 cubic yards (original data provided in acre feet, and converted here). For those 47 years of operation, therefore, the average sedimentation rate has been about 580,000 cubic yards per year.

The data for Twitchell Dam were provided by Ms. Kathleen Garnand, Civil Engineering Associate in the Santa Barbara County Water Agency, who provided a copy of the Twitchell Reservoir Sediment Management Plan, prepared in 2000 by the Santa Barbara County Water Agency with assistance from URS Greiner Woodward Clyde. Twitchell Dam is located on the Cuyama River, and its primary purposes are water supply and flood control. It was completed in 1958, and had an initial capacity of about 241,950,000 cubic yards. By 1999, the capacity of Twitchell Reservoir had been reduced to about 170,980,000 cubic yards (original data provided in acre feet, and converted here). For those 41 years of operation, therefore, the average sedimentation rate has been about 1,730,000 cubic yards per year.

Ventura County: Two dams in Ventura County are discussed: Matilija and Santa Felicia (Figure A.3).The data for Matilija Dam were provided by Mr. Charles Burton, Division Engineer in the Flood Control Agency of the County of Ventura Public Works Agency. Matilija Dam is located on Matilija Creek, and its primary purpose is water supply (Brownlie and Taylor 1981). It was completed in 1947, and had an initial capacity of about 11,270,000 cubic yards. By 1999, the reservoir capacity had been reduced to about 840,000 (original data provided in acre feet, and converted here). For those 52 years of operation, therefore, the average sedimentation rate has been about 200,000 cubic yards per year.

The data for Santa Felicia Dam were provided by Mr. James Kentosh, Manager, Operations and Maintenance Department, United Water Conservation District. The Santa Felicia Dam is located on Piru Creek, and its primary purposes are water supply and recreation (Brownlie and Taylor 1981). It was completed in 1955, and had an initial capacity of about 161,300,000 cubic yards. A bathymetric survey of the reservoir, conducted by Fugro West, indicated that, by 1996, the capacity of Lake Piru had been reduced to about 140,630,000 cubic yards (original data provided in acre feet, and converted here). For the 41 years of operation, therefore, the average sedimentation rate has been about 500,000 cubic yards per year. For the period from 1985 to 1996, however, the average sedimentation rate was only about 170,000 cubic yards per year.

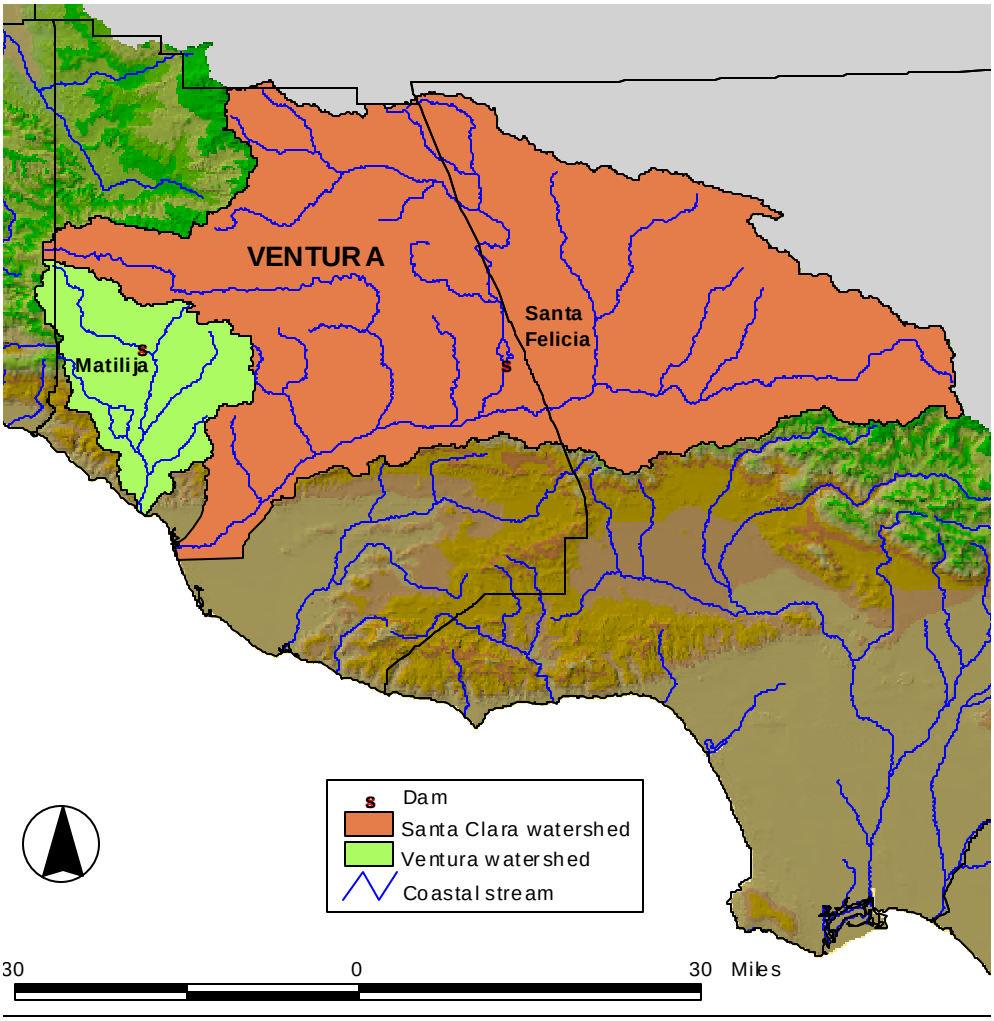

Figure A.3 Locations of Matilija Dam on Matilija Creek, and Santa Felicia Dam on Piru Creek, in Ventura County

Los Angeles County: Seven dams in Los Angeles County are discussed: Big Tujunga, Devil's Gate, Hansen, Puddingstone, San Gabriel, Santa Fe, and Sepulveda (Figure A.4). The data for Big Tujunga Flood Control Basin were obtained from a report compiled by the U.S. Interagency Advisory Committee on Water Data (Subcommittee on Sedimentation 1992). The dam is located on Big Tujunga Creek, and its primary purposes are flood control and water supply (Brownlie and Taylor 1981). It was completed in 1931, and had an initial capacity of about 10,070,000 cubic yards (original data provided in acre feet, and converted here). Average sedimentation rate data are available for fourteen intervals between 1931 and 1982. Large volumes of sediment were removed from the basin at least five times during this period. An average sedimentation rate for the 51-year period was obtained by time-weighting the average-sediment-accumulation-

per-survey-interval data provided in the 1992 report. From this analysis it is estimated that, between 1931 and 1982, the average sedimentation rate was about 230,000 cubic yards per year.

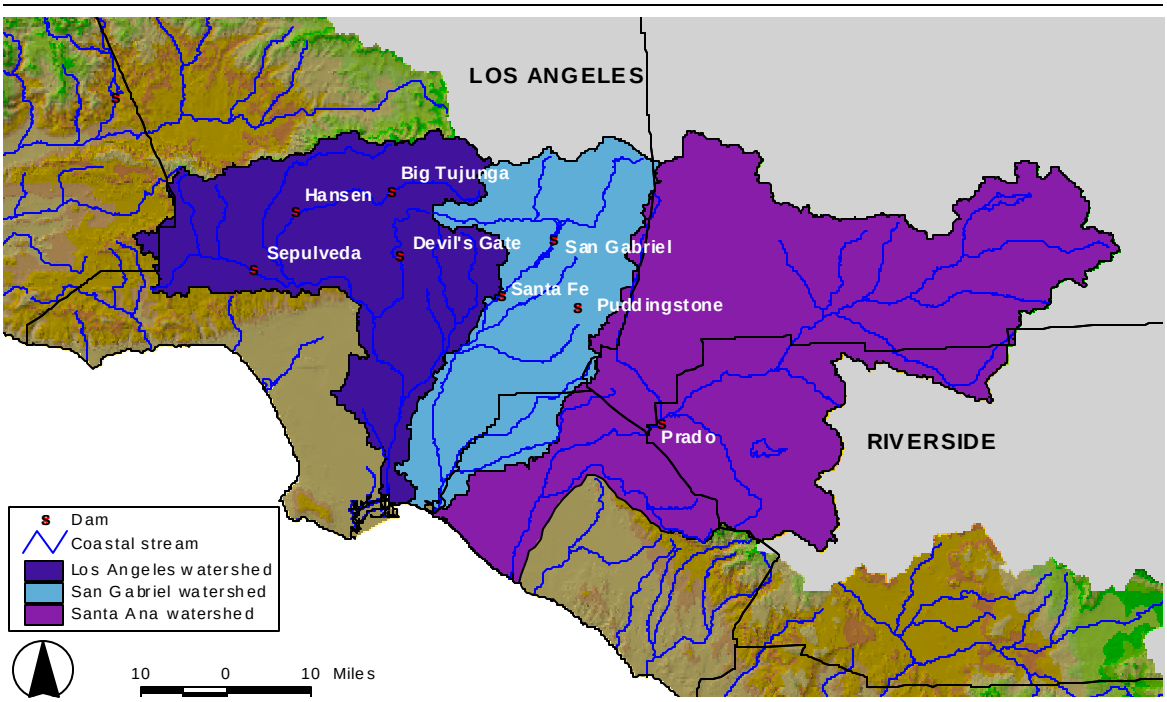

Figure A.4 Locations of Big Tujunga Dam on Big Tujunga Creek, Devil's Gate Dam on Arroyo Seco, Hansen Dam on Tujunga Wash, Puddingstone Dam on Walnut Creek, San Gabriel Dam on the San Gabriel River, Santa Fe Dam on the San Gabriel River, and Sepulveda Dam on the Los Angeles River, all in Los Angeles County, and Prado Dam on the Santa Ana River in Riverside County

The data for Devil's Gate Dam were obtained from a report compiled by the U.S. Interagency Advisory Committee on Water Data (Subcommittee on Sedimentation 1992). The dam is located on Arroyo Seco, and its primary purposes are flood control and water supply (Brownlie and Taylor 1981). It was completed in 1919, and had an original capacity of about 7,420,000 cubic yards (original data provided in acre feet, and converted here). Average sedimentation rate data are available for sixteen intervals between 1919 and 1982. Large volumes of sediment were removed from the basin at least three times during this period. An average rate for the 63-year period was obtained by time-weighting the average-sediment-accumulation-per-survey-interval data provided in the 1992 report. From this analysis, it is estimated that, between 1919 and 1982, the average sedimentation rate was about 120,000 cubic yards per year.

The data for Hansen Dam were obtained from a report compiled by the U.S. Interagency Advisory Committee on Water Data (Subcommittee on Sedimentation 1992). Hansen Dam is

located on Tujunga Wash, and its primary purpose is flood control (Brownlie and Taylor 1981). It was completed in 1940, and had an original capacity of about 57,750,000 cubic yards (original data provided in acre feet, and converted here). Average sedimentation rate data are available for eight intervals between 1940 and 1983. A large volume of sediment was removed from the basin at least once during this period. An average rate for the 43-year period was obtained by time-weighting the average-sediment-accumulation-per-survey-interval data provided in the 1992 report. From this analysis, it is estimated that, between 1940 and 1983, the average sedimentation rate was about 420,000 cubic yards per year. According to Mr. Brian Tracy, Chief of the Reservoir Regulation Section of the U.S. Army Corps of Engineers Los Angeles District, there has been active sand and gravel mining from the basin. Thus, the average sedimentation rate calculated above represents a minimum value.

The data for Puddingstone Dam were obtained from a report compiled by the U.S. Interagency Advisory Committee on Water Data (Subcommittee on Sedimentation 1992). Puddingstone is located on Walnut Creek, and its primary purposes are flood control and recreation (Brownlie and Taylor 1981). It was completed in 1925, and had an original capacity of about 28,060,000 cubic yards (original data provided in acre feet, and converted here). Average sedimentation rate data are available for four intervals between 1925 and 1980. There is no indication of substantial sediment removal during this (or any other) period. An average rate for the 55-year period was obtained by time-weighting the average-sediment-accumulation-per-survey-interval data provided in the 1992 report. From this analysis, it is estimated that, between 1925 and 1980, the average sedimentation rate was about 50,000 cubic yards per year.

The data for San Gabriel Dam were obtained from a report compiled by the U.S. Interagency Advisory Committee on Water Data (Subcommittee on Sedimentation 1992). The dam is located on the San Gabriel River, and its primary purposes are flood control and water supply (Brownlie and Taylor 1981). It was completed in 1932. The reservoir had a capacity of about 86,040,000 cubic yards in 1937 (original data provided in acre feet, and converted here). Average sedimentation rate data are available for nineteen intervals between 1937 and 1983. Large volumes of sediment were removed from the basin at least five times during this period. An average rate for the 46-year period was obtained by time-weighting the average-sediment-accumulation-per-survey-interval data provided in the 1992 report. From this analysis, it is estimated that, between 1937 and 1983, the average sedimentation rate was about 770,000 cubic yards per year.

The data for Santa Fe Dam were obtained from a report compiled by the U.S. Interagency Advisory Committee on Water Data (Subcommittee on Sedimentation 1992). The dam is located on the San Gabriel River, and its primary purposes are flood control and water supply (Brownlie and Taylor 1981). It was completed in 1943. The reservoir had an initial capacity of about 55,920,000 cubic yards (original data provided in acre feet, and converted here). Average

sedimentation rate data are available for six intervals between 1943 and 1982. Large volumes of sediment were removed from the basin at least once during this period. An average rate for the 39-year period was obtained by time-weighting the average-sediment-accumulation-per-survey-interval data provided in the 1992 report. From this analysis, it is estimated that, between 1943 and 1982, the average sedimentation rate was about 200,000 cubic yards per year.

The data for Sepulveda Dam were obtained from a report compiled by the U.S. Interagency Advisory Committee on Water Data (Subcommittee on Sedimentation 1992). The dam is located on the Los Angeles River, and its primary purpose is flood control (Brownlie and Taylor 1981). It was completed in 1941. The reservoir had an initial capacity of about 26,970,000 cubic yards in 1941 (original data provided in acre feet, and converted here). Average sedimentation rate data are available for two intervals between 1941 and 1980. For this 39-year period, there has been negligible sedimentation in the reservoir. Average annual sedimentation rates are trivial.

Riverside County: Prado Dam is the only Riverside County dam to be considered here (Figure A.4). The data for Prado Dam were obtained from a report compiled by the U.S. Interagency Advisory Committee on Water Data (Subcommittee on Sedimentation 1992). The dam is located on the Santa Ana River, and its primary purposes are flood control and recreation (Brownlie and Taylor 1981). It was completed in 1941. The reservoir had an initial capacity of about 359,440,000 cubic yards (original data provided in acre feet, and converted here). Average sedimentation rate data are available for three intervals between 1941 and 1979. There has been no significant sediment removal from the reservoir. An average rate for the 38-year period was obtained by time-weighting the average-sediment-accumulation-per-survey-interval data provided in the 1992 report. From this analysis, it is estimated that, between 1941 and 1979, the average sedimentation rate was about 1,130,000 cubic yards per year. Based upon data obtained in a telephone conversation with Mr. Brian Tracy, Chief of the Reservoir Regulation Section of the US Army Corps of Engineers Los Angeles District, the sedimentation rate from 1979 to 1988 was at least 1,380,000 cubic yards per year.

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